What is claimed is:

1. Apparatus for measuring displacement that scans radiated light on the surface of a measuring object and measures the amount of displacement of the surface of the measuring object without contact based upon the detected position of an image formation point formed on a light receiving plane of a light receiving element, comprising:

projecting means that scans radiated light on the surface of the measuring object to form an irradiation point; and

light receiving means that receives measuring beams from the irradiation point on the light receiving plane of the light receiving element and forms an image formation point, wherein:

the light receiving means comprises:

a lens array which is composed of plural condenser lenses having a uniform image formation characteristic around the optical axis, in which the plural condenser lenses are arranged in a direction scanned by the radiated light and which converges the measuring beams; and

an imaging lens that has a uniform image formation characteristic around the optical axis and converges the measuring beams to form the image formation point on the light receiving plane.

2. Apparatus for measuring displacement according to Claim 1, wherein:

the light receiving element is provided in a position apart by the focal length from the imaging lens.

3. Apparatus for measuring displacement according to Claim 1 or 2, wherein:

each optical axis of the plural condenser lenses is mutually parallel; and

the plural condenser lenses are arranged in parallel in a position apart by the focal length from the irradiation point in a line orthogonal to each optical axis and form the lens array.

4. Apparatus for measuring displacement according to any of Claims 1 to 3, wherein:

relationship in arrangement among the lens array, the imaging lens and the light receiving element is expressed by an expression $0 < (f2/f1) \cdot t < w$.

However, w means the light receiving width parallel with the direction of a scan of the light receiving plane, t means the width parallel with the direction of a scan of each condenser lens, f1 means the focal length of the condenser lens and f2 means the focal length of the imaging lens.

5. Apparatus for measuring displacement according to any of Claims 1 to 4, wherein:

~~the projecting means makes the scanned radiated light~~ vertically incident on the surface of the measuring object to form an irradiation point; and

a pair of light receiving means are provided at equal ~~distance from the irradiation point in symmetrical positions~~ from the optical path plane of the scanned radiated light.

6. Apparatus for measuring displacement according

to Claim 5, comprising:

displacement operation means that operates and outputs a displacement signal of the surface of the measuring object based upon the position of the image formation point formed on each light receiving plane of the pair of light receiving elements.

7. Apparatus for measuring displacement according to Claim 6, wherein:

the displacement operation means comprises:

two preadders that respectively add a pair of electric signals acquired from symmetrical positions from the optical path plane of the scanned radiated light after four electric signals acquired corresponding to an image formation position on each light receiving plane of the pair of light receiving elements are respectively converted from current to voltage;

an adder that adds each electric signal acquired in the preadders;

a subtracter that subtracts an electric signal acquired in one of the preadders from an electric signal acquired in the other; and

a divider that divides an electric signal acquired in the subtracter by an electric signal acquired in the adder.

8. Apparatus for measuring displacement according to Claim 6, wherein:

the displacement operation means comprises an adder and a subtracter in every light receiving means:

said adder adding a pair of electric signals after the pair of electric signals acquired corresponding to an image formation

position on each light receiving plane of the light receiving element are respectively converted from current to voltage; and

said subtracter subtracting one of the pair of electric signals from the other;

an addition signal adder that adds addition signals acquired from each adder;

a subtraction signal adder that adds subtraction signals acquired from each subtracter; and

a divider that divides an electric signal acquired in the subtraction signal adder by an electric signal acquired in the addition signal adder.

9. Apparatus for measuring displacement according to Claim 6, wherein:

the displacement operation means comprises an adder, a subtracter and a divider in every light receiving means:

said adder adding a pair of electric signals after the pair of electric signals acquired corresponding to an image formation position on the light receiving plane of the light receiving element are respectively converted from current to voltage;

said subtracter subtracting one of the pair of electric signals from the other; and

said divider dividing a subtraction signal acquired in the subtracter by an addition signal acquired in the adder;

switching means that receives each displacement signal corresponding to a value divided in each divider and a displacement signal corresponding to the average value of the divided values so as to switchably output one of displacement

signal;

level determination means that determines whether each addition signal meets a predetermined reference value or not; and

selecting means that selectively outputs a suitable one of each displacement signal input to the switching means by switching based upon the result of determination in the level determination means.

10. Apparatus for measuring displacement that scans radiated light on the surface of a measuring object and measures the amount of displacement of the surface of the measuring object without contact based upon the detected position of an image formation point formed on the light receiving plane of a light receiving element, comprising:

projecting means that radiates light for scanning the surface of the measuring object and forming an irradiation point;

light receiving means that receives measuring beams from the irradiation point on the light receiving plane of the light receiving element and forms an image formation point, wherein:

the light receiving means comprises:

a lens array which is composed of plural condenser lenses having a uniform image formation characteristic around the optical axis, in which the plural condenser lenses are arranged in a direction scanned by the radiated light and which converges the measuring beams; and

an imaging lens that has a uniform image formation characteristic around the optical axis and converges the measuring beams to form the image formation point on the light receiving plane;

displacement operation means that operates and outputs the amount of displacement of the surface of the measuring object based upon the position of the image formation point formed on the light receiving plane of the light receiving element; and

processing means that detects the deviation of the image formation position caused because of the dispersion of the image formation positions of light passed in the lens array in plural locations in the direction of a scan, corrects and outputs the amount of displacement of the surface of the measuring object based upon the detected deviation.

11. Apparatus for measuring displacement according to Claim 10, wherein:

the processing means comprises:

deviation detection means that detects the deviation of the image formation point using a reference object;

correction value storage means that stores deviation detected by the deviation detection means as correction data; and

displacement correction means that corrects and outputs the amount of displacement output from the displacement operation means based upon the correction data stored in the correction value storage means when the amount of

displacement of the surface of the measuring object is measured.

12. Apparatus for measuring displacement according to Claim 11, comprising:

scan initiation detection means that outputs a scan initiation signal every time the radiated light is scanned; and

counting means that counts the current position scanned by radiated light based upon a scan initiation signal from the scan initiation detection means, wherein:

the deviation detection means correlates the detected deviation with the current position scanned by radiated light output from the counting means and stores in correction value storage means as correction data; and

the displacement correction means reads correction data corresponding to the current position scanned by radiated light output from the counting means from the correction value storage means, corrects the amount of displacement output from the displacement operation means by the read correction data.

13. Apparatus for measuring displacement that scans light radiated toward the surface of a measuring object and measures the amount of displacement of the surface of the measuring object without contact based upon the position of an image formation point formed on the light receiving plane of a light receiving element, comprising:

projecting means that scans radiated light on the surface of the measuring object to form an irradiation point;

light receiving means that receives measuring beams from the irradiation point on the light receiving plane of the

light receiving element and forms an image formation point, wherein:

the light receiving means comprises:

a lens array which is composed of plural condenser lenses having a uniform image formation characteristic around the optical axis, in which the plural condenser lenses are arranged in a direction scanned by the radiated light and which converges the measuring beams; and

an imaging lens that has a uniform image formation characteristic around the optical axis and converges the measuring beams to form the image formation point on the light receiving plane;

scan initiation detection means that detects a point at which a scan by light is started on the surface of the measuring object;

displacement operation means that operates and outputs the amount of displacement on the surface of the measuring object based upon the position of the image formation point formed on the light receiving plane of the light receiving element; and

processing means that corrects and outputs the amount of displacement based upon the deviation of the image formation position caused because of the dispersion of image formation positions by light passed in the lens array, wherein:

the processing means has a calibration mode and a measurement mode;

in the calibration mode, the deviation of image formation

position caused because of the dispersion of image formation positions by light passed in the lens array is detected in plural locations in the direction of a scan using a reference object; and

in the measurement mode, the amount of displacement of the surface of the measuring object is respectively corrected in the plural location in the direction of a scan based upon the detected deviation and is output.

14. A displacement measuring method of scanning an irradiation point formed by light radiated toward the surface of a measuring object, converging light from the irradiation point by a lens array which is composed of plural condenser lenses having a uniform image formation characteristic around the optical axis and in which the plural condenser lenses are arranged in the direction of a scan by the radiated light and measuring the amount of displacement of the surface of the measuring object without contact based upon the deviation of an image formation position caused because of the dispersion of the positions of image formation points on the light receiving plane by forming an image formation point on the light receiving plane of a light receiving element, which comprises:

detecting the deviation of the image formation position on the light receiving plane of the light receiving element of each point in the direction of a scan of the surface of the measuring object by using a reference object beforehand; and

respectively correcting the amount of displacement at each point in the direction of a scan acquired in measuring the measuring object based upon the detected deviation.

15. A displacement measuring method according to Claim 14, wherein:

detecting a scan position of the radiated light by counting time since the scan is started; and

using the detected scan position for detecting the deviation and for correction.